

PRELIMINARY DATA SUMMARY

August 1992

U.S. Army Engineer Waterways Experiment Station
Coastal Engineering Research Center
Field Research Facility
Duck, North Carolina

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CERC Field Research Facility
Duck, North Carolina

This report provides a summary of basic oceanographic, meteorological and bottom profile data for the month. The data were obtained as part of the Measurements and Analysis work units at the U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's Field Research Facility (FRF) in Duck, North Carolina. The FRF staff collected and analyzed these data. These summaries are intended to make the data readily available to all FRF users, and comments on their content and usefulness are invited.

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PART I: INTRODUCTION

The U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's (CERC) Field Research Facility (FRF) is located on the Outer Banks of North Carolina, near the village of Duck (Figure 1).

The FRF research program provides a means for obtaining high-quality field data, particularly during storms, in support of the U.S. Army Corps of Engineers' coastal engineering research missions. The research pier is a reinforced concrete structure supported on 0.9-m-diam steel piles spaced 12.2 m apart along the pier's length and 4.6 m apart across the width. The pier deck is 6.1 m wide and extends from behind the duneline to about the 6-m water depth contour at a height of 7.6 m above the National Geodetic Vertical Datum (NGVD). In addition, a main building contains offices, an instrument repair shop, and a data acquisition room.

One of the responsibilities of the FRF research program is the collection, analysis and dissemination of data on local oceanographic and meteorological conditions. Bottom profiles along both sides of the pier and periodic bathymetric surveys are also performed.

This summary is intended to provide basic data as soon as possible after they are obtained. Questions and/or comments concerning the data may be directed to Mr. Clifford F. Baron at (919) 261-3511.

Part II presents the meteorological data; Parts III through VI present oceanographic data; Part VII presents nearshore profiles and bathymetry; and Part VIII, if included, documents special events that occurred at the FRF during the month.

Table 1 is a list of instruments used, their operational status during the month, and the data collection status. Figure 2 identifies the location of the instruments. The water depths at the wave gages and current meters vary and may be determined from information contained in Figure 7. Other installation information is contained in Table 1.

Times given in the report, unless otherwise specified, are referenced to eastern standard time (EST).

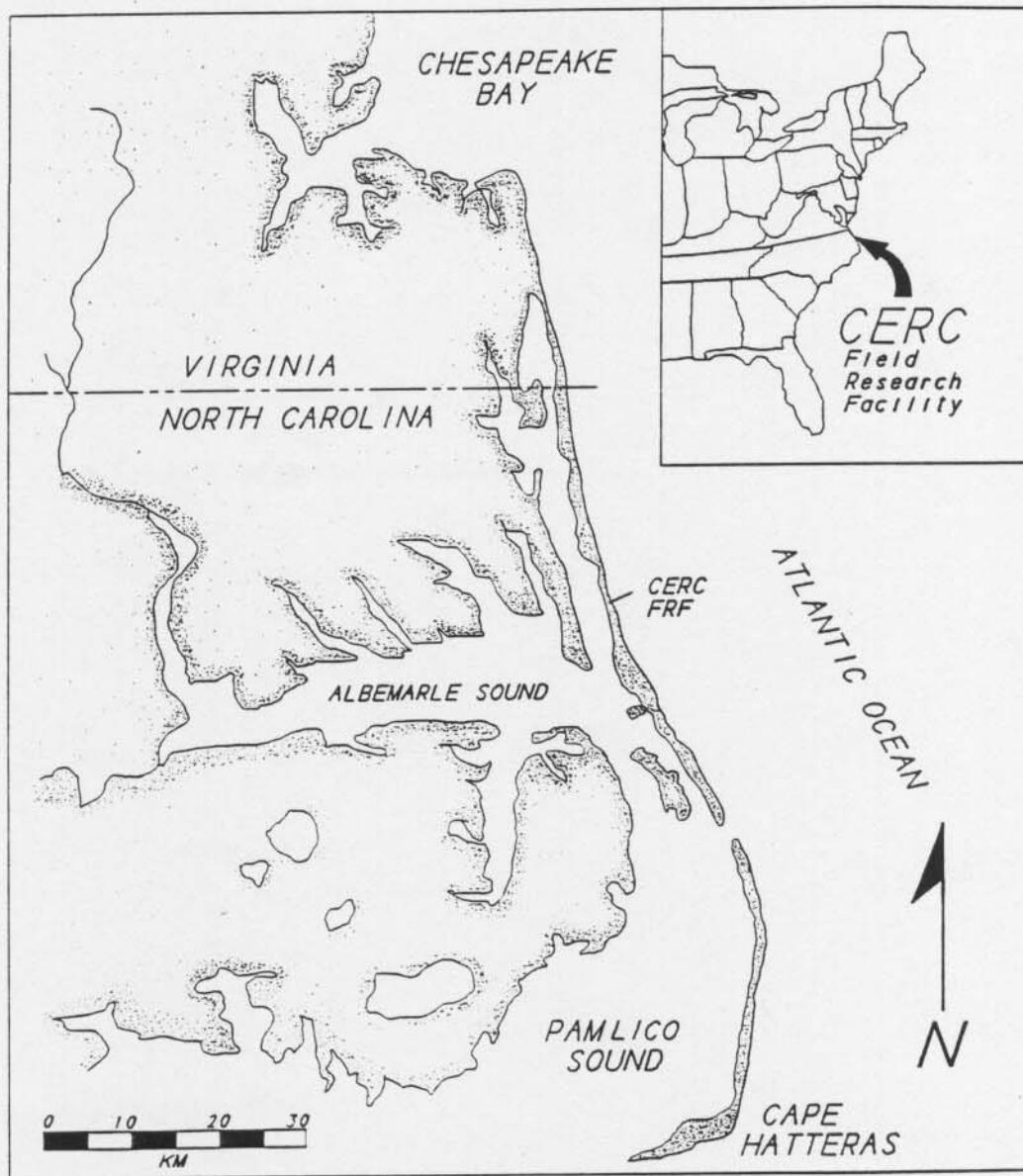


Figure 1. FRF Location Map

Table 1: Instrument Status/Data Availability

AUGUST 1992

Gage ID	Description/Remarks	Depth at Sensor		Day of the month																																
				1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1		
616	Barometric Pressure		Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
604	Precipitation		Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
624	Air Temperature		Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
932	Anemometer at seaward end of pier Elevation 19 m (NGVD)		Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
625	Baylor staff at station 18+60 on FRF pier	see Figure 7	Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
111	Pressure gage 309 m north of FRF pier (0.9 km offshore)	Approx. 7.8 m NGVD	Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	/ - -		
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
630	Waverider buoy 4.0 km offshore	Approx. 17 m NGVD	Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
519	Current meter 320 m north of FRF pier (0.9 km offshore)	see Figure 7	Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
865-1370	NOAA tide station at seaward end of FRF pier		Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*			
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*				
	Supplemental Observations (daily oceanographic and meteorological observations)		Daily observation	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Gage Status

Operational = *

Partial = /

Non-Operational = -

Daily Observation

Complete = *

Partial = /

None = -

Data Collected

All = *

Partial = /

None = -

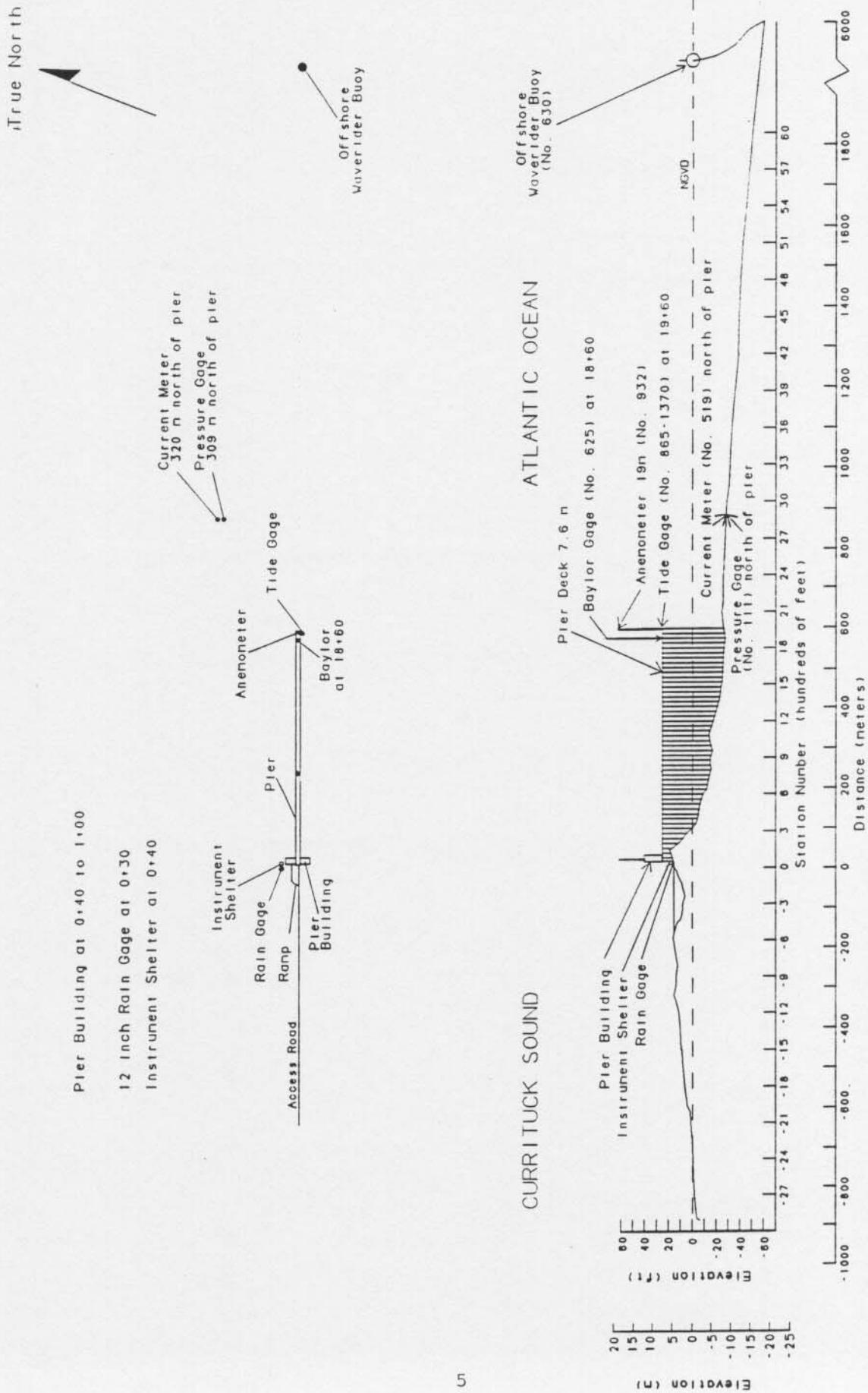


Figure 2. Instrument locations at FRF (all elevations from NGVD, all distances from FRF baseline).

PART II: METEOROLOGICAL DATA

A variety of instruments have been installed at the FRF (Figure 2) to monitor the meteorological conditions. The data presented in Table 2 are collected and stored using a Digital Equipment Corporation VAX 11/750. For each instrument identified in Table 1 as having analog outputs, chart records are obtained, a log is maintained and the records are stored for future reference.

Winds were measured at the end of the pier at an elevation of 19 m (Figure 2) using a Weather Measure Skyvane anemometer.

Monthly resultant wind speeds and directions are determined by vector averaging the data. Wind directions indicate where the wind is coming from. Temperature and atmospheric pressure means are the average of the values presented for the month. Total precipitation is the sum for the month.

The following may be useful for converting the data in Table 2 to other frequently used units of measurement:

1. Millimeters (mm) to inches (in.) -
 $mm \times .03937 = in.$
2. Millibars (mb) to inches of mercury (in. Hg) -
 $mb \times 0.02953 = in. Hg$
3. Degrees Celsius (C) to degrees Fahrenheit (F) -
 $(C \times 9/5) + 32 = F$
4. Meters per second (m/s) to knots (kn) -
 $m/s \times 1.943 = kn$

Table 2: Meteorological Data

Aug 1992

Day	Hour	Wind Speed m/sec	Wind Direction deg TN	Temperature deg C	Atm Pressure mb	Precipitation mm
1	100	1	213	24.0	1010.8	0
	700	9	348	21.6	1013.5	0
	1300	6	352	22.3	1016.5	0
	1900	4	33	21.1	1017.0	0
2	100	2	54	20.6	1018.0	0
	700	2	96	23.5	1019.0	0
	1300	2	77	26.0	1018.1	0
	1900	3	93	22.4	1016.1	0
3	100	3	150	22.3	1015.0	0
	700	5	260	25.1	1014.5	0
	1300	2	90	26.7	1014.3	0
	1900	5	201	25.0	1012.4	0
4	100	7	221	25.3	1012.5	0
	700	4	231	24.9	1011.9	0
	1300	2	236	28.9	1010.7	0
	1900	3	164	24.0	1011.4	0
5	100	1	33	23.4	1013.4	0
	700	7	38	24.8	1016.1	0
	1300	6	60	25.4	1017.9	0
	1900	7	65	23.4	1018.2	0
6	100	7	68	23.2	1018.3	0
	700	9	22	21.2	1020.2	3
	1300	9	47	23.7	1019.9	4
	1900	9	38	22.9	1019.7	0
7	100	7	47	22.6	1019.7	0
	700	7	45	22.9	1019.9	0
	1300	5	36	24.4	1020.5	0
	1900	6	30	22.7	1020.0	0
8	100	3	52	22.6	1019.9	0
	700	3	35	23.4	1020.9	0
	1300	3	78	26.3	1020.4	0
	1900	5	134	23.8	1018.2	0
9	100	5	198	24.5	1017.8	0
	700	5	213	25.2	1016.9	0
	1300	6	212	30.7	1014.2	0
	1900	8	307	24.8	1015.1	3
10	100	6	242	25.1	1012.2	9
	700	3	280	25.0	1012.3	0
	1300	3	99	27.5	1012.6	0
	1900	3	169	25.0	1011.0	0
11	100	5	219	25.4	1011.5	0
	700	5	220	25.8	1011.9	0
	1300	6	208	31.6	1011.2	0
	1900	8	205	28.2	1010.1	0
12	100	7	97		1012.4	0
	700	1	109		1013.6	41
	1300	7	29		1015.0	11
	1900	4	81		1016.6	9
13	100	1	165	Gage	1017.4	0
	700	1	56		1016.9	0
	1300	5	182		1014.8	3
	1900	8	212	Inoperative	1012.9	14
14	100	10	230		1013.0	16
	700	3	316		1016.1	0
	1300	10	50		1016.3	0
	1900	4	129		1015.4	18
15	100	5	170		1015.1	8
	700	7	179		1014.2	0
	1300	6	219		1016.5	12
	1900	1	208		1016.1	0
16	100	6	123		1016.0	39
	700	6	155		1016.8	3
	1300	4	62		1017.6	0
	1900	5	142		1017.5	3

* electronic problems

(Continued)

(Sheet 1 of 2)

Table 2: Meteorological Data

Aug 1992

Day	Hour	Wind Speed m/sec	Wind Direction deg TN	Temperature deg C	Atm Pressure mb	Precipitation mm
17	100	3	129	23.6	1018.1	0
	700	1	149	24.0	1018.3	8
	1300	3	136	24.7	1018.0	0
	1900	4	186	24.6	1016.4	0
18	100	5	289	21.8	1016.0	0
	700	1	6	23.2	1016.2	6
	1300	1	55	26.3	1016.1	0
	1900	4	140	23.4	1015.5	0
19	100	1	182	22.4	1016.1	0
	700	3	242	23.9	1016.0	0
	1300	2	225	28.4	1014.9	0
	1900	8	184	27.7	1013.4	0
20	100	2	357	23.5	1014.3	43
	700	4	20	24.5	1014.7	0
	1300	5	52	23.1	1015.9	0
	1900	6	26	22.7	1016.6	0
21	100	7	33	22.3	1017.2	0
	700	8	41	22.6	1019.6	0
	1300	6	27	24.0	1021.1	0
	1900	6	56	22.2	1020.8	0
22	100	5	61	21.4	1021.3	0
	700	6	50	21.8	1022.1	0
	1300	6	52	23.1	1022.4	0
	1900	6	60	21.6	1021.8	0
23	100	6	64	21.4	1021.7	0
	700	6	60	22.3	1023.1	0
	1300	7	54	24.1	1024.1	0
	1900	7	68	22.4	1023.4	0
24	100	6	54	22.2	1023.5	0
	700	6	49	22.9	1024.2	0
	1300	4	67	25.8	1024.1	0
	1900	5	83	23.2	1023.1	0
25	100	4	110	22.8	1022.4	0
	700	1	115	24.6	1022.5	0
	1300	3	109	27.8	1021.8	0
	1900	5	150	24.2	1019.9	0
26	100	4	234	23.9	1019.0	0
	700	4	264	24.2	1019.1	0
	1300	3	232	28.6	1017.9	0
	1900	2	257	26.4	1016.4	0
27	100	2	270	25.1	1015.7	0
	700	3	275	24.2	1015.4	0
	1300	2	79	30.1	1014.0	0
	1900	6	219	24.1	1012.7	0
28	100	6	212	24.7	1011.9	0
	700	6	188	25.9	1011.4	0
	1300	11	174	27.0	1007.9	0
	1900	6	237	25.3	1007.8	0
29	100	3	237	24.4	1009.3	0
	700	5	341	21.3	1012.4	0
	1300	4	12	24.8	1013.2	0
	1900	3	57	22.0	1015.5	0
30	100	2	171	20.0	1016.9	0
	700	4	67	21.9	1018.9	0
	1300	4	124	24.9	1018.8	0
	1900	6	153	22.1	1017.1	0
31	100	5	209	22.9	1016.4	0
	700	5	236	23.2	1016.9	0
	1300	6	237	28.5	1015.4	0
	1900	3	232	26.1	1015.1	0
		Resultant	1	Mean	24.2	Total
			101		1016.6	253

* electronic problems

(Sheet 2 of 2)

PART III: WAVE DATA

Wave data are collected from a Baylor staff gage (Gage 625), a pressure wave gage (Gage 111) and a Waverider buoy (Gage 630) as shown in Table 1 and Figure 2. The data are collected, analyzed, and stored on optical disc using a Digital Equipment Corporation VAX 11/750 programmed to sample the wave gages every 3 hr. The sampling rate is two times per second for five contiguous 34-min records. This report reflects the data collection periods of 0100, 0700, 1300, and 1900 EST. The results are based only on the first 34 minute record.

Wave height H_{mo} is an energy-based statistic equal to four times the standard deviation of the sea surface elevations. Wave height reported from the pressure gage has been compensated for hydrodynamic attenuation using linear wave theory. Wave period is identified from the computation of a variance (energy) spectrum with 60 deg of freedom calculated from a 34-min record. Peak wave period T_p is defined as the period associated with the maximum energy in the spectrum. When this analysis is complete, the data are written to optical disc.

Table 3 presents the wave heights and periods for each wave record obtained at 6 hr intervals during the month. The monthly means and standard deviations from the means shown in Table 3 are average values computed from this data. Figure 3 is a time history of all H_{mo} and T_p values obtained for all gages.

Differences in wave periods between wave gages (Table 3 and Figure 3) may be the result of wave breaking, wave reformation, or the presence of multiple wave trains containing nearly equal energy.

Table 3: Wave Data

Aug 1992

Day	Hour	625		111		630	
		Baylor at 18+60	Hmo,m	Pressure Gage	Hmo,m	Offshr	Wvrdr
1	0100		0.28	11.64	0.34	8.53	0.44
	0700		0.32	8.53	0.32	12.19	0.42
	1300		0.79	5.12	0.87	5.12	1.00
	1900		0.58	5.69	0.65	5.69	0.81
2	0100		0.45	5.22	0.53	4.49	0.62
	0700		0.39	8.83	0.42	9.85	0.53
	1300		0.42	5.45	0.42	8.53	0.45
	1900		0.39	8.83	0.38	8.53	0.41
3	0100		0.33	8.83	0.33	8.26	0.39
	0700		0.36	8.26	0.36	8.53	0.41
	1300		0.38	3.88	0.36	8.83	0.38
	1900		0.37	8.00	0.38	8.26	0.41
4	0100		0.35	3.71	0.33	8.53	0.45
	0700		0.32	4.83	0.34	5.02	0.45
	1300		0.36	4.92	0.37	8.53	0.49
	1900		0.34	10.67	0.33	10.67	0.47
5	0100		0.32	8.26	0.30	8.83	0.41
	0700		0.52	3.01	0.43	3.28	0.69
	1300		0.71	4.20	0.65	4.13	0.85
	1900		0.61	4.66	0.61	4.41	0.81
6	0100		0.75	4.13	0.72	4.34	0.92
	0700		1.03	4.66	1.09	4.41	1.27
	1300		1.41	5.45	1.36	5.45	1.57
	1900		1.21	5.57	1.24	6.40	1.42
7	0100		1.20	7.53	1.24	6.56	1.43
	0700		1.20	7.76	1.28	7.53	1.41
	1300		1.15	8.26	1.22	7.76	1.18
	1900		1.04	7.76	1.00	7.76	1.15
8	0100		1.19	8.83	1.30	8.83	1.28
	0700		0.93	8.26	0.95	7.76	1.00
	1300		0.80	9.14	0.85	8.83	0.85
	1900		0.76	9.14	0.86	8.53	0.89
9	0100		0.70	9.14	0.76	8.83	0.74
	0700		0.62	9.14	0.57	7.76	0.65
	1300		0.56	9.14	0.58	9.14	0.76
	1900		0.52	8.83	0.47	8.26	0.72
10	0100		0.35	8.83	0.33	8.26	0.47
	0700		0.32	8.53	0.35	7.76	0.42
	1300		0.42	6.74	0.40	7.31	0.43
	1900		0.35	8.26	0.36	7.76	*
11	0100		0.34	8.00	0.37	7.31	*
	0700		0.38	6.74	0.42	6.56	0.47
	1300		0.37	8.26	0.40	8.00	0.51
	1900		0.42	7.76	0.41	8.00	*
12	0100		0.70	4.34	0.70	4.13	*
	0700		0.61	7.76	0.57	7.53	0.66
	1300		0.46	8.00	0.50	7.11	0.58
	1900		0.43	7.76	0.38	7.53	0.50
13	0100		0.41	7.53	0.43	7.31	0.55
	0700		0.46	9.48	0.45	8.53	0.57
	1300		0.46	7.76	0.44	8.53	0.52
	1900		0.67	5.69	0.65	5.69	0.87
14	0100		0.44	6.92	0.50	6.56	0.85
	0700		0.80	6.24	0.86	6.09	0.88
	1300		1.20	6.92	1.18	7.11	1.31
	1900		1.07	4.74	1.12	5.12	1.34
15	0100		0.82	6.56	0.80	6.92	0.98
	0700		0.88	7.31	0.93	7.53	1.16
	1300		0.99	7.76	1.09	6.92	1.33
	1900		0.88	7.11	0.99	8.26	1.08
16	0100		0.78	7.31	0.75	7.53	1.01
	0700		0.81	8.26	0.84	8.53	1.07
	1300		0.64	7.53	0.69	8.00	0.87
	1900		0.71	8.83	0.69	6.92	0.83

* Electronic problems

(Continued)

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Table 3: Wave Data

Aug 1992

Day	Hour	625		111		630	
		Baylor at 18+60 Hmo, m	Tp, sec	Pressure Gage Hmo, m	Tp, sec	Offshr Wvrdr Hmo, m	Tp, sec
17	0100	0.60	8.00	0.65	7.76	0.86	6.74
	0700	0.54	7.53	0.59	6.92	0.74	6.74
	1300	0.53	7.53	0.55	6.92	0.65	7.31
	1900	0.57	7.76	0.59	7.11	0.75	7.76
18	0100	0.56	7.53	0.56	7.53	0.69	7.76
	0700	0.56	6.24	0.65	6.09	0.72	6.24
	1300	0.62	7.31	0.69	7.76	0.77	7.11
	1900	0.68	7.31	0.80	8.83	0.85	8.26
19	0100	0.61	8.83	0.69	8.26	0.76	8.53
	0700	0.71	8.26	0.76	7.76	0.90	8.26
	1300	0.67	8.53	0.74	8.00	0.89	8.00
	1900	0.69	8.26	0.68	8.26	0.84	7.76
20	0100	0.52	8.53	0.59	8.83	0.71	8.00
	0700	0.61	8.26	0.63	6.92	0.68	7.53
	1300	0.63	8.00	0.57	6.74	0.72	7.53
	1900	0.66	7.31	0.61	8.26	0.73	7.11
21	0100	0.76	8.53	0.65	3.71	0.85	8.53
	0700	1.01	4.41	1.02	4.27	1.11	4.20
	1300	0.87	5.45	0.81	5.12	0.95	5.22
	1900	0.83	8.26	0.83	7.31	0.91	5.69
22	0100	0.84	8.26	0.84	8.26	1.00	5.02
	0700	0.85	13.47	0.83	13.47	0.98	13.47
	1300	0.92	12.19	0.98	12.19	1.11	12.19
	1900	0.86	11.64	0.83	11.64	1.00	11.64
23	0100	0.84	11.13	0.75	11.13	0.91	11.13
	0700	0.77	11.13	0.74	10.67	0.89	11.13
	1300	0.87	10.67	0.76	10.67	1.05	10.24
	1900	0.89	9.85	0.86	9.85	0.98	9.85
24	0100	0.88	9.85	0.83	9.48	0.98	9.48
	0700	0.94	10.24	0.95	10.24	1.05	9.85
	1300	0.99	9.14	0.99	9.14	1.17	9.14
	1900	0.76	8.53	0.79	8.83	0.93	7.53
25	0100	0.65	7.31	0.66	7.11	0.86	7.53
	0700	0.61	7.31	0.57	7.11	0.72	7.76
	1300	0.53	7.31	0.55	6.74	0.65	6.74
	1900	0.45	7.76	0.48	7.31	0.61	7.11
26	0100	0.45	7.31	0.48	6.56	0.58	7.11
	0700	0.42	7.31	0.48	7.31	0.52	7.11
	1300	0.45	8.26	0.50	9.14	0.54	8.83
	1900	0.46	8.83	0.55	8.83	0.56	8.00
27	0100	0.48	11.13	0.58	7.76	0.58	8.00
	0700	0.55	8.26	0.59	8.53	0.62	8.83
	1300	0.44	8.83	0.57	9.48	0.54	9.48
	1900	0.51	9.14	0.60	9.14	0.62	9.14
28	0100	0.39	8.00	0.51	8.53	0.58	8.83
	0700	0.43	8.53	0.45	8.53	0.51	8.26
	1300	0.48	8.53	0.52	8.53	0.74	8.00
	1900	0.46	9.14	0.49	7.76	0.56	7.53
29	0100	0.31	7.53	0.39	7.31	0.41	9.85
	0700	0.56	9.14	0.49	7.11	0.69	3.66
	1300	0.49	8.83	0.58	7.31	0.71	7.31
	1900	0.54	8.53			0.63	4.27
30	0100	0.37	7.53			0.52	7.53
	0700	0.73	4.66	Gage		0.90	4.34
	1300	0.46	7.53			0.60	7.53
	1900	0.44	7.53	Inoperative		0.51	7.76
31	0100	0.33	7.11			0.43	8.26
	0700	0.35	8.53			0.45	7.31
	1300	0.31	8.53			0.37	8.83
	1900	0.33	7.31			0.43	7.76
Mean		0.62	7.79	0.66	7.73	0.77	7.47
Std dev		0.25	1.81	0.25	1.77	0.27	1.82

* Electronic problems

(Sheet 2 of 2)

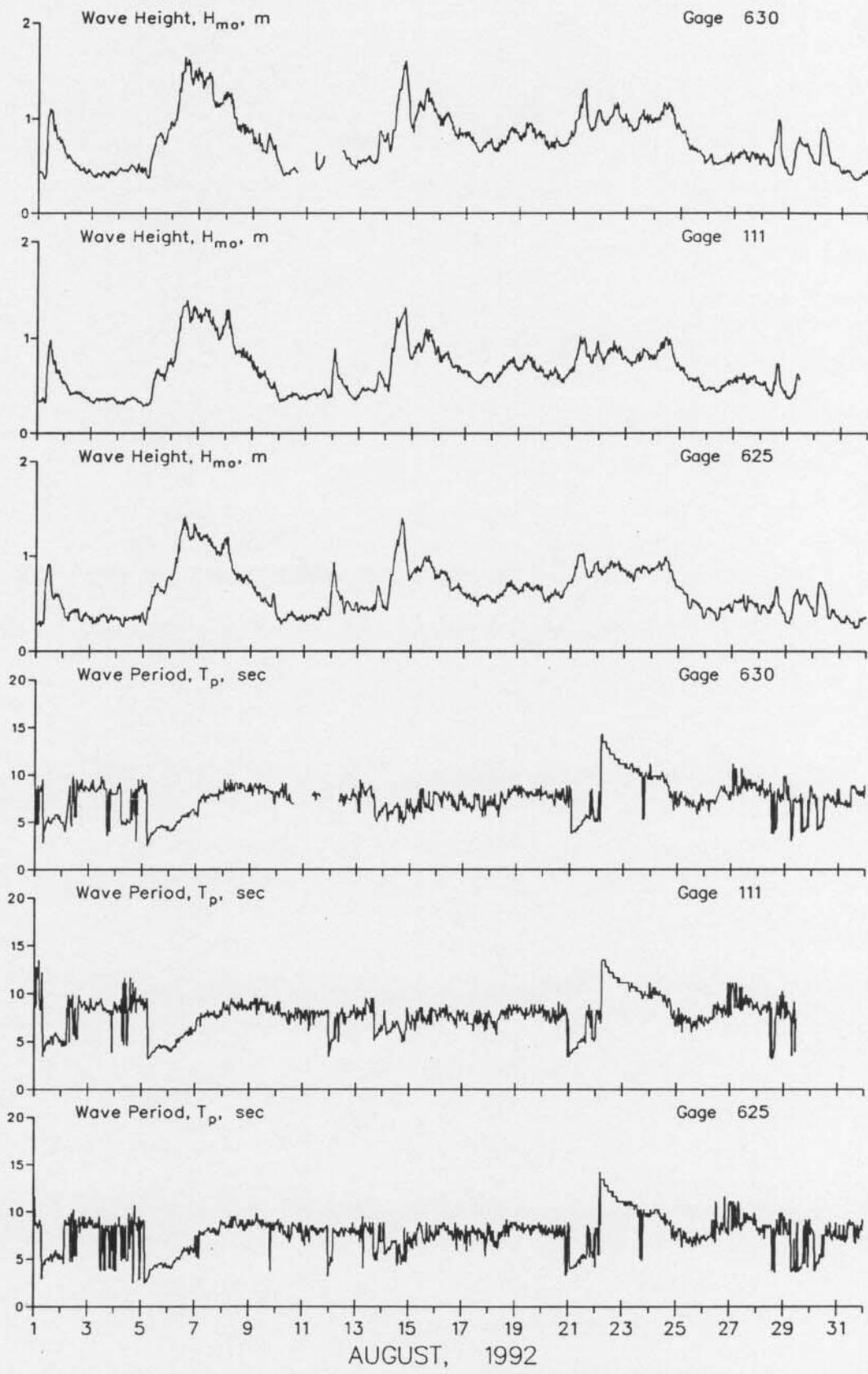


Figure 3. Time history of wave heights and periods

PART IV: CURRENT DATA

Current data (Table 4) are collected from a Marsh-McBirney electromagnetic biaxial current meter (Table 1 and Figure 2) and by visually observing the movement of dye on the water surface in the surf and at the seaward end of the pier, as well as 500 m updrift of the pier 12 m offshore.

Since the shoreline orientation is approximately N20W, longshore currents flow either toward 340 deg (i.e. northward) or toward 160 deg (i.e. southward). Similarly, cross-shore currents are either onshore (westward) or offshore (eastward).

All current speeds are given in centimeters per second (cm/sec). Resultant speeds and directions are determined by vector averaging the cross-shore and longshore data. Current directions indicate the direction that the current is moving towards.

IMPORTANT NOTE

Direction resultants regarding the current meter data (gages 519 and 529) may be in error by minus 5 degrees due to a faulty compass reading. Please call us if you must use this data.

Table 4: Current Data
Aug 1992

Day	Time	Pier Measurements				Beach Measurements				Current Meter	
		Dye at (579 m) (surface)	Distance from Baseline (m)	Speed	Dir	Dye 12m offshore (surface)	Location	Speed	Dir	Speed	Dir
1	0100-Along Cross Result									0.9 km Offshore Depth -5.6m (NGVD) ID #519	
1	0700-Along Cross Result	24 29 38	S on 210	142	38 11 40	S on 177	North	75	S	3 0 3	340
1	1300-Along Cross Result									19 19 26	S off 115
1	1900-Along Cross Result									7 5 9	N off 18
2	0100-Along Cross Result									8 3 9	S off 137
2	0700-Along Cross Result	44 7 44	S on 169	152	4 1 4	S on 169	North	5	N	17 14 22	S off 122
2	1300-Along Cross Result									19 12 22	S off 128
2	1900-Along Cross Result									7 1 7	S off 149
3	0100-Along Cross Result									22 6 23	S off 145
3	0700-Along Cross Result	13 13 18	S off 115	152	0 5 5	off 70	South	30	N	7 5 9	S off 122
3	1300-Along Cross Result									10 9 13	S off 118
3	1900-Along Cross Result									1 3 3	N on 268
4	0100-Along Cross Result									0 2 2	on 250
4	0700-Along Cross Result	15 11 18	N off 17	165	25 3 26	N off 346	South	25	N	7 4 8	N on 308
4	1300-Along Cross Result									10 4 11	N off 5
4	1900-Along Cross Result									9 5 11	N on 312
5	0100-Along Cross Result									7 1 7	N on 328
5	0700-Along Cross Result	12 12 17	S on 205	165	44 0 44	S 160	North	20	S	3 3 4	N off 25
5	1300-Along Cross Result									2 7 7	N off 57
5	1900-Along Cross Result									1 2 2	N on 284

KEY = All speeds in cm/sec

N = Northward, Shore parallel

S = Southward, Shore parallel

on = onshore off = offshore

Table 4: Current Data (Continued)
Aug 1992

Alongshore Cross-shore Resultant Time Day	Pier Measurements						Beach Measurements			Current Meter			
	Dye at (579 m) (surface)	Speed	Dir	Dye at Mid-Surf Zone (surface)	Distance from Baseline (m)	Speed	Dir	(500m Updrift)	Dye 12m offshore (surface)	Location	Speed	Dir	0.9 km Offshore Depth -5.6m (NGVD) ID #519
6 0100-Along Cross Result											10	N	
6 0700-Along Cross Result	29 15 32	S on 187		177	55 28 62	S on 187			28 S	North	1	on	
6 1300-Along Cross Result											10	335	
6 1900-Along Cross Result											2	N	
7 0100-Along Cross Result											2	off	
7 0700-Along Cross Result	18 0 18	S on 160		189	15 8 17	N off 7			13 N	North	2	20	
7 1300-Along Cross Result											5	off	
7 1900-Along Cross Result											8	125	
8 0100-Along Cross Result											16	S	
8 0700-Along Cross Result	28 7 29	S on 174		201	0 20 20				13 N	North	7	off	
8 1300-Along Cross Result											18	136	
8 1900-Along Cross Result											16	S	
9 0100-Along Cross Result											4	off	
9 0700-Along Cross Result	14 14 19	N off 25		177	55 8 56	N off 349			13 N	North	14	148	
9 1300-Along Cross Result											5	S	
9 1900-Along Cross Result											13	off	
10 0100-Along Cross Result											14	93	
10 0700-Along Cross Result	11 3 12	N off 354		152	11 5 12	N on 313			18 N	North	10	128	
10 1300-Along Cross Result											10	S	
10 1900-Along Cross Result											6	off	
											12	128	
											5	S	
											4	off	
											4	N	
											5	off	
											2	27	
											0	N	
											2	340	
											8	N	
											6	on	
											10	303	
											6	N	
											2	on	
											6	320	
											36	N	
											10	on	
											37	325	
											40	N	
											6	on	
											41	332	
											26	N	
											9	on	
											27	322	
											1		
											4	off	
											4	70	
											16	N	
											1	on	
											16	338	
											12	N	
											2	on	
											12	330	

KEY = All speeds in cm/sec

N = Northward, Shore parallel

S = Southward, Shore parallel

on = onshore off = offshore

Table 4: Current Data (Continued)
Aug 1992

Day	Alongshore Cross-shore Resultant Time	Pier Measurements						Beach Measurements (500m Updrift)			Current Meter	
		Dye at (579 m) (surface)	Distance from Baseline (m)	Dye at Mid-Surf Zone (surface)	Speed	Dir	Dye 12m offshore (surface)	Location	Speed	Dir	0.9 km Offshore Depth -5.6m (NGVD) ID #519	
11 0100	Along Cross Result										5	N
11 0700	Along Cross Result	19 10 21	N off 7	152	30 8 31	N off 354	South	30	N	2	on	
11 1300	Along Cross Result									5	313	
11 1900	Along Cross Result									4	S	
12 0100	Along Cross Result									3	on	
12 0700	Along Cross Result	61 0 61	N off 340	165	47 14 49	N on 323	South	37	N	3	224	
12 1300	Along Cross Result									4	on	
12 1900	Along Cross Result									5	304	
13 0100	Along Cross Result									2	N	
13 0700	Along Cross Result	17 4 18	N on 326	152	20 5 20	N on 326	South	3	N	4	off	
13 1300	Along Cross Result									12	15	
13 1900	Along Cross Result									0	S	
14 0100	Along Cross Result									3	on	
14 0700	Along Cross Result	55 14 57	S on 174	165	51 0 51	S off 160	North	66	S	6	250	
14 1300	Along Cross Result									14	N	
14 1900	Along Cross Result									1	off	
15 0100	Along Cross Result									4	352	
15 0700	Along Cross Result	3 4 5	N off 31	165	16 0 16	N off 340	South	8	S	1	167	
15 1300	Along Cross Result									15	145	
15 1900	Along Cross Result									14	138	

KEY = All speeds in cm/sec
 N = Northward, Shore parallel
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 on = onshore off = offshore

Table 4: Current Data (Continued)
Aug 1992

Day	Time	Pier Measurements				Beach Measurements (500m Updrift)			Current Meter		
		Alongshore Cross-shore Resultant	Dye at (579 m) (surface)	Dye at Mid-Surf Zone (surface)	Distance from Baseline (m)	Speed	Dir	Dye 12m offshore (surface)	Location	Speed	Dir
16	0100-Along Cross Result									23	S
										13	off
										26	131
16	0700-Along Cross Result	30 0	N 340	152	27 7 on 326	N 27 326		5 N		10 2 10	S on 169
16	1300-Along Cross Result									9 3 9	S off 142
16	1900-Along Cross Result									6 2 6	S on 177
17	0100-Along Cross Result									7 7 10	S on 206
17	0700-Along Cross Result	34 7 35	N off 351	152	28 4 off 349	N off 349		18 N		2 9 10	N on 264
17	1300-Along Cross Result									8 1 8	S off 150
17	1900-Along Cross Result									10 1 10	S on 168
18	0100-Along Cross Result									10 3 11	S on 175
18	0700-Along Cross Result	0 0 0		163	41 20 off 45	N off 7		66 N		1 2 2	
18	1300-Along Cross Result									15 6 16	S off 139
18	1900-Along Cross Result									5 4 7	S on 199
19	0100-Along Cross Result									6 1 6	S on 172
19	0700-Along Cross Result	0 10 10		165	0 0 0			44 N		7 1 7	S off 152
19	1300-Along Cross Result									10 1 10	S off 152
19	1900-Along Cross Result									7 4 8	S off 129
20	0100-Along Cross Result									5 1 5	S on 172
20	0700-Along Cross Result	23 0 23	S 160	165	47 0 47	N 0 340		33 N		14 1 14	S off 157
20	1300-Along Cross Result									17 12 20	S off 125
20	1900-Along Cross Result									17 5 18	S off 144

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Table 4: Current Data (Continued)
Aug 1992

Alongshore Cross-shore Resultant Time	Pier Measurements				Beach Measurements				Current Meter			
	Dye at (579 m) (surface)	Speed	Dir	Dye at Mid-Surf Zone (surface)	Distance from Baseline (m)	Speed	Dir	Dye 12m offshore (surface)	Location	Speed	Dir	
Day												
21 0100-Along Cross Result										0.9 km		
										Offshore		
										Depth -5.6m		
										(NGVD)		
										ID #519		
										Speed	Dir	
21 0700-Along Cross Result	36	S			177	34	S		5	N	22	S
	18	off				25	on				10	off
	40	133				42	197				24	137
21 1300-Along Cross Result									North			
21 1900-Along Cross Result											19	S
22 0100-Along Cross Result											4	off
22 0700-Along Cross Result	8	S			177	30	N		3	N	19	149
	14	on				15	off				17	S
	16	221				34	7				10	off
22 1300-Along Cross Result											20	129
22 1900-Along Cross Result											22	S
23 0100-Along Cross Result											8	off
23 0700-Along Cross Result	10	S			201	55	N		5	N	23	141
	7	on				0					13	S
	12	197				55	340				7	off
23 1300-Along Cross Result									South		15	133
23 1900-Along Cross Result											18	S
24 0100-Along Cross Result											9	off
24 0700-Along Cross Result	14	S			201	41	N		3	N	9	84
	4	on				0					11	off
	14	177				41	340				12	84
24 1300-Along Cross Result											1	S
24 1900-Along Cross Result											12	off
25 0100-Along Cross Result											12	73
25 0700-Along Cross Result	10	S			189	47	N		33	N	14	S
	3	on				19	off				5	off
	10	177				51	2				15	142
25 1300-Along Cross Result											9	on
25 1900-Along Cross Result											2	171
											0	
											0	
											2	
											0	
											340	
											3	
											3	
											103	
											13	
											1	
											13	
											13	
											11	
											4	
											11	
											319	

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Table 4: Current Data (Continued)
Aug 1992

Alongshore Cross-shore Resultant Time	Pier Measurements						Beach Measurements			Current Meter	
	Dye at (579 m) (surface)		Dye at Mid-Surf Zone (surface)		(500m Updrift)			Dye 12m offshore (surface)		0.9 km Offshore Depth -5.6m (NGVD) ID #519	
Day	Speed	Dir	Distance from Baseline (m)	Speed	Dir	Location	Speed	Dir	Speed	Dir	
26 0100-Along Cross Result									19	N	
									6	on	
									20	322	
26 0700-Along Cross Result	0			0			3	N	8	N	
	13	off	177	0		South			2	on	
	13	70		0	0				9	324	
26 1300-Along Cross Result									13	N	
									6	on	
									14	314	
26 1900-Along Cross Result									3	N	
									3	on	
									4	292	
27 0100-Along Cross Result									4	N	
									2	on	
									4	316	
27 0700-Along Cross Result	13	S		30	N		24	N	9	S	
	13	off	152	5	off	South			5	on	
	18	115		31	349				10	188	
27 1300-Along Cross Result									6	S	
									6	off	
									9	113	
27 1900-Along Cross Result									2	S	
									1	on	
									2	192	
28 0100-Along Cross Result									4	S	
									0		
									4	160	
28 0700-Along Cross Result	24	N		27	N		12	N	5	N	
	10	off	140	8	off	North			0		
	26	2		28	357				5	340	
28 1300-Along Cross Result									2	N	
									3	on	
									4	288	
28 1900-Along Cross Result									9	N	
									7	on	
									12	302	
29 0100-Along Cross Result									1	S	
									3	on	
									3	236	
29 0700-Along Cross Result	34	S		41	S		28	S	7	S	
	0		140	0		North			6	off	
	34	160		41	160				9	122	
29 1300-Along Cross Result									3	S	
									10	off	
									10	89	
29 1900-Along Cross Result									5	N	
									3	on	
									6	308	
30 0100-Along Cross Result									10	S	
									5	off	
									11	135	
30 0700-Along Cross Result	13	S		10	S		37	S	12	S	
	8	on	140	3	on	North			10	off	
	15	191		10	177				16	118	
30 1300-Along Cross Result									12	S	
									6	off	
									14	133	
30 1900-Along Cross Result									3	N	
									4	on	
									5	288	

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S = Southward, Shore parallel
on = onshore off = offshore

Table 4: Current Data (Concluded)
Aug 1992

Alongshore Cross-shore Resultant ---- Time	Pier Measurements				Beach Measurements (500m Updrift)			Current Meter	
	Dye at (579 m) (surface)	Distance from Baseline (m)	Speed	Dir	Dye 12m offshore (surface)	Location	Speed	Dir	0.9 km Offshore Depth -5.6m (NGVD) ID #519
Day 31 0100-Along								1	N
Cross								0	
Result								1	340
31 0700-Along	15	N			25	N		15	N
Cross	15	off	140		4	off		5	on
Result	21	25			26	349	South	16	322
31 1300-Along								6	N
Cross								1	off
Result								6	349
31 1900-Along								5	N
Cross								4	off
Result								6	13

KEY = All speeds in cm/sec
 N = Northward, Shore parallel
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PART V: SUPPLEMENTAL OBSERVATIONS

Visual wave direction measurements (Table 5) of both the primary wave train (i.e. that having the larger wave heights) and the secondary wave train (which must be clearly distinguishable as a wave train separate from the primary waves but not surface chop or capillary waves) are taken daily at the seaward end of the pier. The direction of the primary wave train just north of the seaward end of the pier is also determined using a Raytheon Marine Pathfinder radar and measuring the alignment of the wave crests at approximately the same location as the visual measurements. The pier axis (considered perpendicular to the beach at the FRF) is oriented 70 deg east of true north; consequently, wave angles greater than 70 deg indicate that the waves were coming from the south side of the pier.

The width of the surf zone (seawardmost breaker position to shoreline) is determined from the pier deck.

Measurements of surface water temperature, density, and visibility are also taken daily at the seaward end of the pier. A jar along with a thermometer is lowered about 0.3 m into the water and allowed to remain for at least one minute. The jar is removed, the temperature read, and a hydrometer is used to determine the density. A Secchi disc is used to determine the surface visibility.

Table 5: Supplemental Observations

Aug 1992

Day	Time	Wave Approach		Radar Wave Angle deg from True N	Width of Surf Zone,m	Water Characteristics at Pier End		
		Angle at Pier End deg from True N Primary	Secondary			Temp., C	Density g/cc	Secchi Vis., m
1	0745	5		35	15	18.3	1.0240	4.3
2	0915	90	20		8	21.1	1.0226	5.2
3	0745	100	350		8	22.2	1.0219	3.7
4	0800	120			14	21.1	1.0224	3.4
5	0735	20		70	32	23.3	1.0216	4.9
6	0800	70	20	35	91	23.3	1.0216	2.4
7	0745	75		80	171	23.3	1.0213	1.8
8	0845	90			117	23.9	1.0206	4.9
9	0900	75			85	23.9	1.0205	3.4
10	0740	75	5		40	23.9	1.0208	5.2
11	0730	115			31	24.4	1.0207	4.0
12	0800	80			33	23.9	1.0225	4.0
13	0745	10			14	23.9	1.0225	5.5
14	0745	355			70	22.2	1.0220	2.7
15	0900	30	135		41	23.3	1.0210	3.0
16	0900	90	140	90	30	23.3	1.0200	3.7
17	0745	110			34	22.2	1.0212	3.0
18	0710	100			44	21.7	1.0219	3.7
19	0730	90		inoperative	50	22.8	1.0217	2.7
20	0645	80		90	52	24.3	1.0200	3.0
21	0750	30		60	73	23.7	1.0191	3.7
22	0915	40		95	60	23.7	1.0186	3.4
23	1000	85	45	90	76	23.8	1.0181	4.3
24	0800	80	45	100	76	24.0	1.0173	3.0
25	0750	80			71	24.6	1.0176	4.0
26	0805	90			42	23.4	1.0221	3.0
27	0810	95			41	24.5	1.0218	3.0
28	0650	75	110		14	24.1	1.0222	4.3
29	0807	10			15	20.8	1.0232	3.7
30	0750	90			29	20.2	1.0222	5.8
31	0745	110			27	21.8	1.0226	3.0

PART VI: WATER LEVELS

Since 1978, the National Oceanic and Atmospheric Administration (NOAA)/National Ocean Service (NOS) has operated a primary tide station (No. 865-1370) at the seaward end of the FRF pier. A Leupold-Stevens digital recording float-type tide gage is used to collect instantaneous water level data every 6 minutes throughout the month.

The variation in water level during the month is shown in Figure 4 along with a list of mean and extreme values. This presentation is useful in identifying effects of both meteorological and astronomical forces on the open coast water level.

Table 6 contains the time at the center of each 12.42-hr tidal cycle and the range, high, low, and mean water levels during each tidal cycle.

Table 6: Water Levels, m NGVD

		Aug 1992				
		Mid-Cycle	Low	High	Mean	Range
Day	Time					
1	600	-0.73	0.83	0.09	1.56	
1	1825	-0.49	0.81	0.17	1.30	
2	650	-0.61	0.76	0.09	1.37	
2	1915	-0.52	0.66	0.08	1.18	
3	740	-0.56	0.77	0.12	1.32	
3	2006	-0.42	0.57	0.09	0.99	
4	831	-0.47	0.81	0.17	1.28	
4	2056	-0.38	0.53	0.12	0.91	
5	921	-0.34	0.74	0.21	1.08	
5	2146	-0.28	0.43	0.11	0.71	
6	1012	-0.37	0.70	0.15	1.07	
6	2237	-0.33	0.46	0.11	0.78	
7	1102	-0.32	0.67	0.17	0.99	
7	2327	-0.26	0.45	0.11	0.70	
8	1152	-0.34	0.67	0.16	1.01	
9	18	-0.31	0.42	0.08	0.73	
9	1243	-0.37	0.70	0.13	1.07	
10	108	-0.36	0.45	0.05	0.81	
10	1333	-0.23	0.75	0.25	0.99	
11	158	-0.28	0.55	0.15	0.82	
11	1424	-0.31	0.69	0.19	1.00	
12	249	-0.52	0.60	0.11	1.11	
12	1514	-0.41	0.72	0.17	1.12	
13	339	-0.30	0.62	0.19	0.93	
13	1604	-0.29	0.80	0.27	1.09	
14	430	-0.25	0.82	0.31	1.07	
14	1655	-0.02	0.94	0.44	0.95	
15	520	-0.16	0.88	0.39	1.04	
15	1745	-0.17	0.90	0.39	1.07	
16	610	-0.09	0.88	0.41	0.98	
16	1835	-0.12	0.78	0.31	0.91	
17	701	-0.23	0.73	0.25	0.96	
17	1926	-0.16	0.69	0.26	0.85	
18	751	-0.24	0.76	0.27	1.00	
18	2016	-0.14	0.61	0.21	0.75	
19	841	-0.30	0.73	0.24	1.03	
19	2107	-0.14	0.54	0.17	0.68	
20	932	-0.21	0.79	0.32	1.00	
20	2157	-0.07	0.57	0.25	0.64	
21	1022	-0.13	0.78	0.33	0.92	
21	2247	-0.08	0.51	0.19	0.59	
22	1113	-0.24	0.71	0.25	0.95	
22	2338	-0.18	0.48	0.14	0.66	
23	1203	-0.27	0.72	0.23	1.00	
24	28	-0.30	0.49	0.10	0.79	
24	1253	-0.37	0.80	0.22	1.17	
25	119	-0.32	0.58	0.14	0.89	
25	1344	-0.45	0.81	0.19	1.25	
26	209	-0.48	0.64	0.08	1.13	
26	1434	-0.54	0.91	0.20	1.45	
27	259	-0.49	0.88	0.20	1.37	
27	1525	-0.47	0.99	0.26	1.46	
28	350	-0.54	0.96	0.22	1.50	
28	1615	-0.55	0.84	0.15	1.39	
29	440	-0.62	0.95	0.19	1.58	
29						
30					Gage	
30						
31					Inoperative	
31						

FRF Tide Heights

Aug 1992

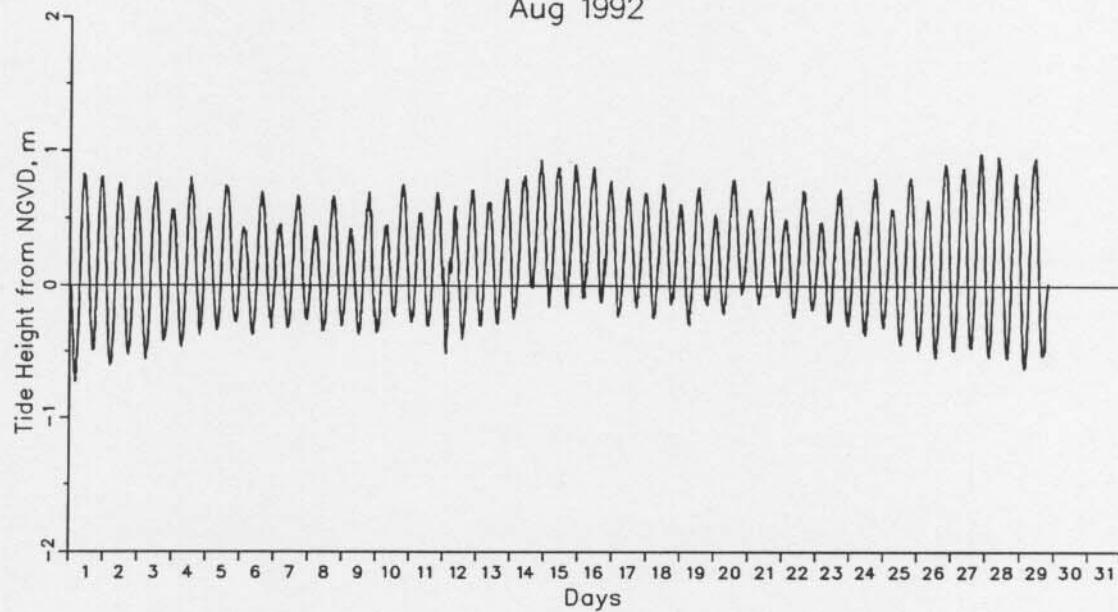


Figure 4. Water level time history

Monthly Water Levels,m NGVD

Extreme Low = -0.73 on day 1 at 300 EST
Extreme High = 0.99 on day 27 at 1848 EST
Monthly Mean = 0.20
Mean Low = -0.33
Mean High = 0.71
Mean Range = 1.04

PART VII: NEARSHORE PROFILES

- A. Nearshore Profiles. In order to document profile response away from the pier, surveys of four profile lines extending 900 to 1,000 m from shore and located 489 and 581 m north and 517 and 608 m south of the FRF pier are conducted bi-weekly, after storms, and during more complete bathymetric surveys.

These profiles are obtained using the CRAB-Geodimeter surveying system; a Geodimeter 140-T self-tracking, electronic theodolite, distance meter, in combination with the Coastal Research Amphibious Buggy (CRAB), a 10.7 m high, self-powered, mobile tripod on wheels.

Figure 5 shows the last survey in July 1992 and the surveys in August 1992 on profile line 188, located 517 m south of the pier.

The profile envelope (Figure 6) reflects the maximum changes that occurred on the profile during 1992. Cross-hatched areas indicate changes to the annual envelope which occurred in August.

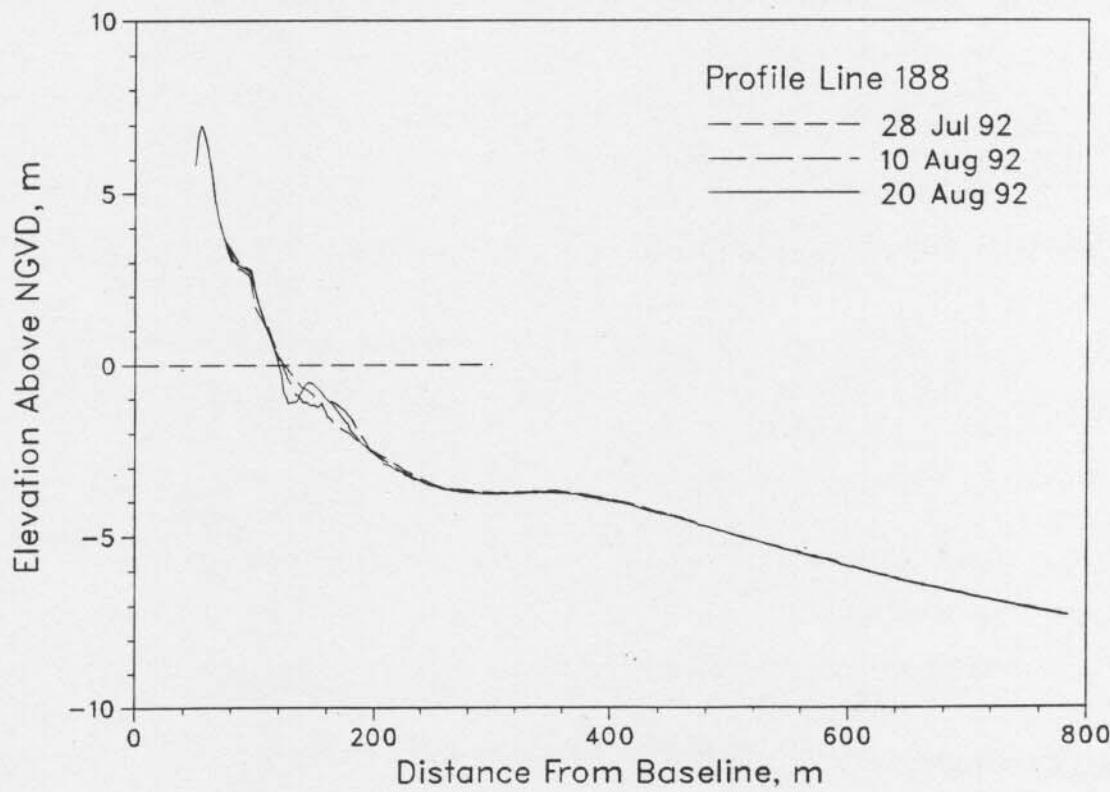


Figure 5. Monthly CRAB profiles on profile 188 - 517 m south of pier.

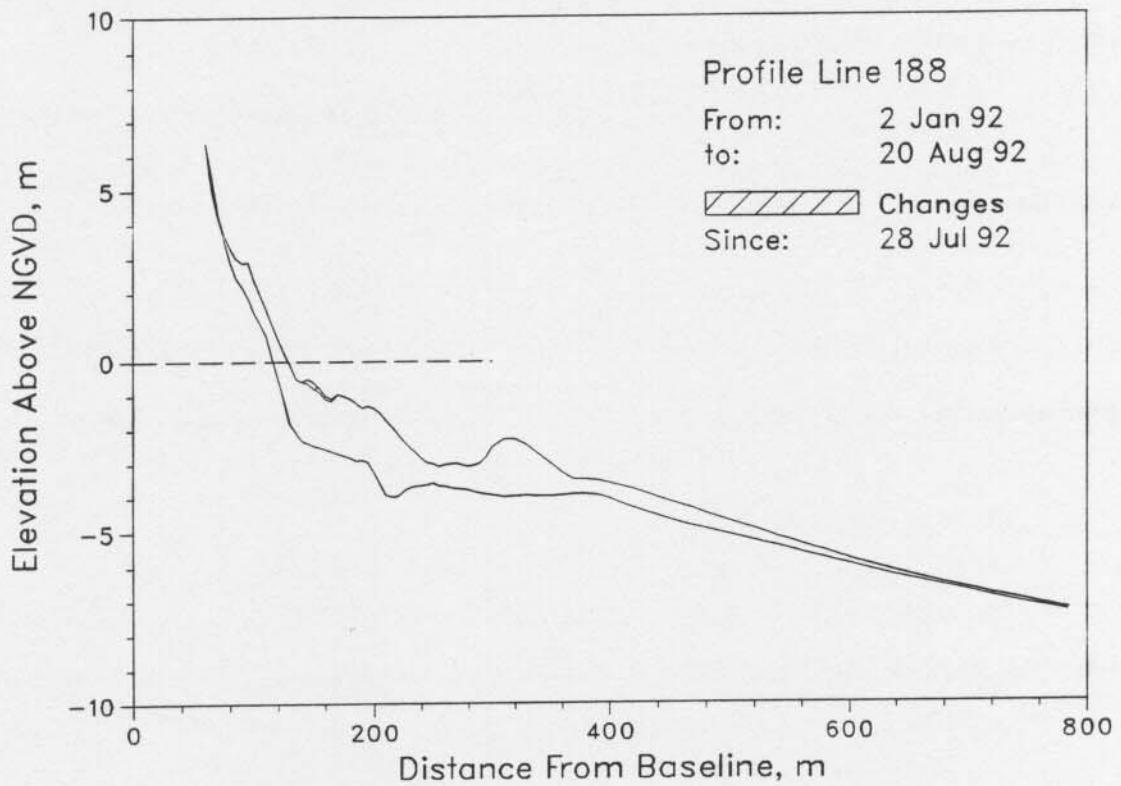


Figure 6. CRAB profile envelope - profile 188.

B. Bathymetry. Figure 7 includes a two- and three-dimensional contour map and a change plot derived from the bathymetric survey on 10 August. Wide contour lines on the change diagram represent eroded areas; thin lines indicate deposition.

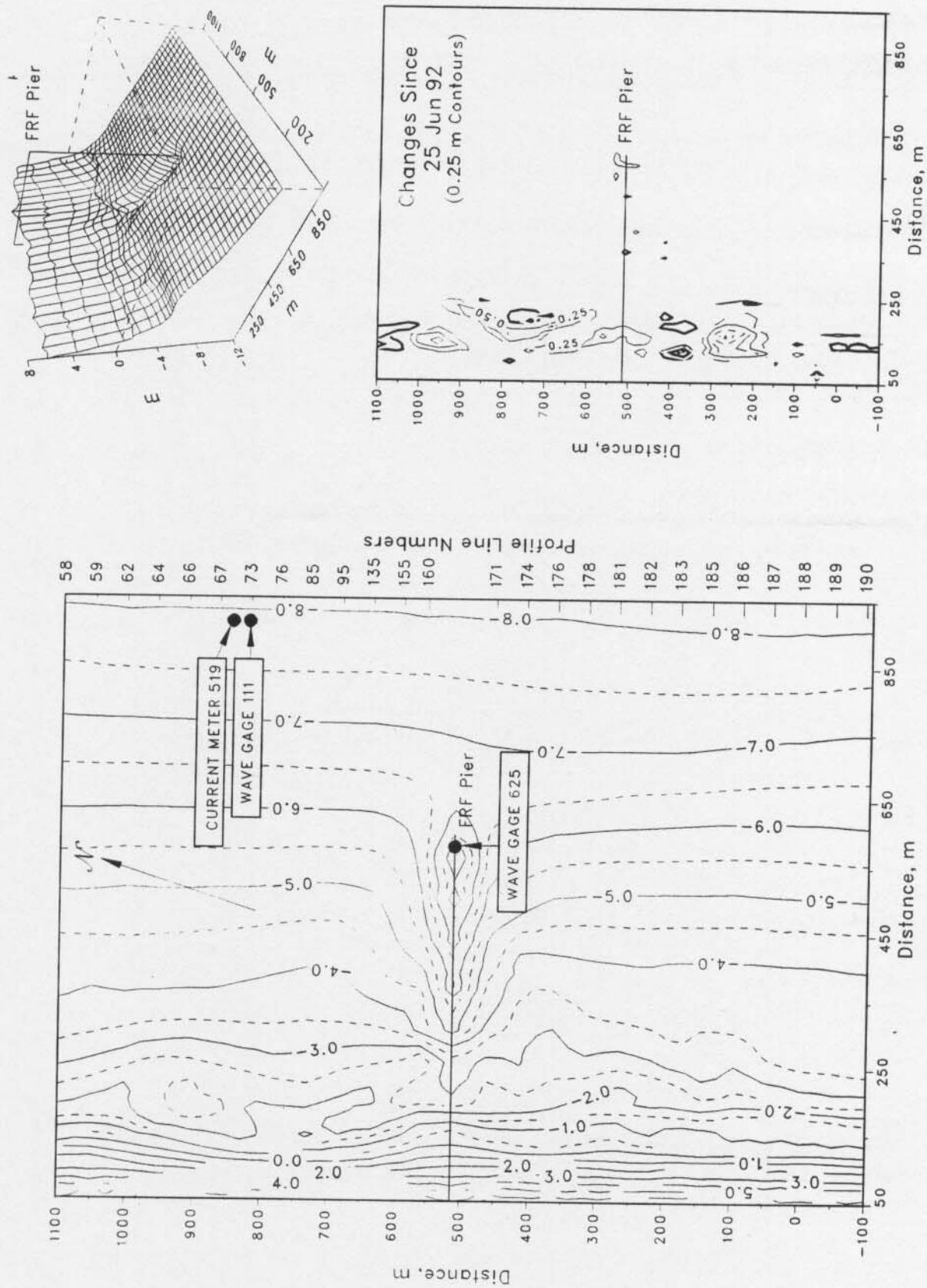


Figure 7. FRF bathymetry 10 Aug 92 depths relative to NGVD

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